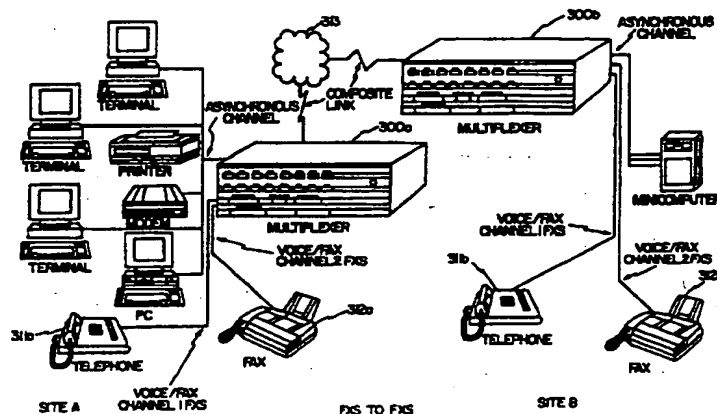




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04M 11/06, H04L 29/06		A3	(11) International Publication Number: WO 95/29576
			(43) International Publication Date: 2 November 1995 (02.11.95)
(21) International Application Number: PCT/US95/05034		(81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date: 18 April 1995 (18.04.95)		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
(30) Priority Data: 08/229,958 19 April 1994 (19.04.94) US 08/333,365 2 November 1994 (02.11.94) US		(86) Date of publication of the international search report: 13 June 1996 (13.06.96)	
(71) Applicant: MULTI-TECH SYSTEMS, INC. [US/US]; 2205 Woodale Drive, Mounds View, MN 55112 (US).			
(72) Inventors: ARIMILLI, Harinarayana; 12185 Lily Street N.W., Coon Rapids, MN 55433 (US). THANAWALA, Ashish, A.; Unit 25, 20812 4th Street, Saratoga, CA 95070 (US). KANCHAN, Vasant, Kumar; 809 Durshire Way, Sunnyvale, CA 94087 (US).			
(74) Agent: RAASCH, Kevin, W.; Schwegman, Lundberg & Woessner, 3500 IDS Center, 80 South Eighth Street, Minneapolis, MN 55402 (US).			

(54) Title: DATA/VOICE/FAX ADVANCED PRIORITY STATISTICAL MULTIPLEXER



(57) Abstract

A data multiplexing network is described which multiplexes a plurality of asynchronous data channels with an asynchronous data stream representing compressed voice signals and/or facsimile signals onto a single synchronous data packet stream. The single synchronous data packet stream is then transmitted by a high speed statistical multiplexer over a composite link to a second site using a modified high-level synchronous data link control protocol with an overlay of an advanced priority statistical multiplexing algorithm. The asynchronous data channels and the compressed voice channel and/or facsimile signals are demultiplexed and reconstructed for sending to other asynchronous computer terminals and to a standard telephone or facsimile analog port at the second site, respectively. PBX trunk interfaces are also provided to allow PBX's to share the composite link between sites. Communication between the first site by voice or facsimile and the second site is transparent to the users. The multiplexer efficiently allocates the bandwidth of the composite link by detecting silence periods in the voice signals and suppressing the sending of the voice information to preserve bandwidth. An advanced priority statistical multiplexer is also described which dynamically allocates composite link bandwidth to both time-sensitive and non-time-sensitive data to maximize data throughput efficiency and quality while simultaneously reducing multiplexer processing overhead.

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 95/05034

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M11/06 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04M H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,5 136 586 (R.D.GREENBLATT) 4 August 1992 see column 1, line 27 - column 2, line 15 see column 2, line 33 - column 3, line 15 see abstract see figure 1 ---	1-8
X	EP,A,0 582 537 (IBM) 9 February 1994 see page 2, line 29 - line 38 see page 3, line 5 - line 30 see figures 1,2,4,5 ---	9-24
Y	---	25-28
Y	EP,A,0 526 104 (ATT) 3 February 1993 see column 2, line 54 - column 3, line 27 see figures 1,2 -----	25-28

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

26 March 1996

Date of mailing of the international search report

25.04.96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

Canosa Arete, C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/05034

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see annexed sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

US-A-5 136 586 describes the combination of compressed voice data and non voice data in a same stream and is considered to represent the best prior art document in relation to which document the special technical features as defined in Rule 13.2, PCT are to be determined.

Claims 1-8 of the application define a data multiplexer (or method for sending information or data multiplexing network) with the special technical features:

1. asynchronous data collection means;
2. telephone interface
3. voice band signal converting means;
4. voice data compression means;
5. means for multiplexing collected asynchronous data and compressed voice data into a synchronous stream.

Claims 9-28 of the application define a method (or apparatus) for multiplexing with the special technical features

1. it is a priority statistical multiplexing method/apparatus;
2. dynamic assignment of low priority packet size;
3. assigning high priority data packet size;
4. and fitting an optimum number of low priority packets between high priority packets.

The special technical features of the first group of claims relate to the problem of improving/realising the combining of voice and non voice data in the same data stream.

The special technical features of the second group of claims relate to the problem of improving/realising the transmission of two types of data with different priorities.

As there are no common nor corresponding special technical features as defined in Rule 13.2, second sentence PCT, these two groups of claims define two different subjects of invention not so linked as to for a single inventive concept (Rule 13.1 PCT).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 95/05034

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5136586	04-08-92	GB-A, B 2268358	05-01-94
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		CA-A- 2068976	03-02-93
		CA-C- 2068976	27-09-94
		JP-A- 7226770	22-08-95